## REMARKS

Reexamination and reconsideration of claims 1-5 and 7-15 are respectfully requested.

Claims 1-5, 7 and 9-15 were rejected under 35 U.S.C. sec. 112, second paragraph, as being indefinite. Claims 1, 5, 9, 10, 11 and 12 recite inner and outer buffer tube layers each comprising a respective helix value. The rejection states that "it is not clear what is meant by a 'helix value' for the tube layer." See the Office Action dated June 26, 2003 at p. 2.

One skilled in the art would have understood that the respective "helix value" for a buffer tube layer would be calculated using equation (1) on p. 7 of the present application. *In other words, equation (1) is a generic equation for calculating the helix value of a stranded element.* Moreover, it is respectfully submitted that one skilled in the art would have understood the exact meaning of the claims.

As objective evidence of this fact, Applicants submit herewith an excerpt from the book Fiber Optic Cables, Mahlke and Gossing, 1997 (the "textbook"). Specifically, page 120 of the textbook describes the concept of stranding elements along with the related geometry and equations for calculating excess length due to stranding. See p. 120 of the textbook. More specifically, the equation (labeled "A") on page 120 of the textbook is equation (1), except that "2R" is substituted for the pitch diameter "P." Stated another way, a diameter is two times the radius.

Additionally, the present application states that "[i]n accordance with the present inventive concepts, the respective helix factor values, for respective layers of buffer tubes in the cable are controlled." See the present application at p. 9, ll. 23-25. Furthermore, Applicants have taken the Primary Examiner's suggestion to amend the claims, and have therefore amended the phrase "helix value" to recite "helix factor value" as used in

the specification.

Regarding claim 4, it has been amended to remove any indefiniteness that may have existed. Withdrawal of the sec. 112 rejection, second paragraph, of claims 1-5, 7 and 9-15 is respectfully requested.

Claim 8 was rejected under 35 U.S.C. sec. 103(a) applying U.S. Pat. No. 5,343,549 ('549) in view of U.S. Pat. No. 5,611,016 ('016). For patents to be applicable under sec. 103(a), the combination of teachings must, *inter alia*, expressly or inherently, teach, disclose, or suggest each and every feature of the claimed invention. Additionally, motivation and suggestion to combine the patents must be present.

Amended claim 8 recites a fiber optic cable system including one or more concatenated cables with at least one cable section having multiple layers of buffer tubes, at least some of the concatenated fibers in a first layer of the system having essentially the same overall fiber length as some of the concatenated fibers in a second layer of the system. Basis for amendment of claim 8 is found at least at p. 12., ll. 21-25 of the present application.

It is respectfully submitted that the applied art, taken alone or in combination with the other art of record, does not implicitly or expressly teach, disclose, or suggest all of the features of claim 8. The skilled artisan would have understood that the outer layer of tubes in the '549 patent are located radially outward of the first layer of tubes. See Fig. 1 of the '549 patent. Thus, because the outer layer is located at a greater radial distance, the outer layer would have a longer length than the inner layer of tubes over the length of the cable. Consequently, the optical fibers within the outer layer of tubes would necessarily be longer than the optical fibers within the inner layer of tubes over a cable system. Whereas, the '016 patent discloses a dispersion-balanced optical cable that

reduces four-photon mixing in Wave Division Multiplexing (WDM) systems. See the Abstract of the '016 patent.

On the other hand, claim 8 recites, *inter alia*, one or more concatenated cables with at least one cable section having multiple layers of buffer tubes, at least some of the concatenated fibers in a first layer of the system having essentially the same overall fiber length as some of the concatenated fibers in a second layer of the system. The combination of references does not teach each and every feature of claim 8. For at least these reasons, withdrawal of the sec. 103(a) rejection of claim 8 is warranted and is respectfully requested.

**No fees are believed due in connection with this Reply. If any fees are due in connection with this Reply, please charge any fees, or credit any overpayment, to Deposit Account Number 19-2167.**

Allowance of all pending claims is believed to be warranted and is respectfully requested.

The Examiner is welcomed to telephone the undersigned to discuss the merits of this patent application.

Respectfully submitted,

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# Fiber Optic Cables

Fundamentals
Cable Engineering
Systems Planning

By Günther Mahlke and Peter Gössing

3rd, revised and enlarged edition, 1997

Siemens Aktiengesellschaft

Die Deutsche Bibliothek – CIP-Einheitsaufnahme

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# Preface

During the past years
in the field of commu
cable technology, here
waveguides – also cal
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emitting diodes and p
tems already in oper
fiber technology.

This book is intended
design understandable
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The third edition cor
new developments in
principles has been u
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This revised edition
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Grateful acknowledg
persons, who contr
S. Kirchmann, A. K

May 1997

In helical stranding the stranding elements form a screw-type line comparable to a spiral staircase. Its length of pitch after a full turn of 360° is called the *lay length S*. The angle between the stranding elements and the cable cross-section is called the slope of stranding or *stranding angle* $\alpha$. The distance between the axis of the cable and the middle of the stranding element is called the *stranding radius R*. Therefore the length $L$ of a stranding element and the stranding angle $\alpha$ (Figure 9.8) can be calculated as

$$L = S\sqrt{1 + \left(\frac{2\pi R}{S}\right)^2};$$

$$\alpha = \arctan \frac{S}{2\pi R},$$

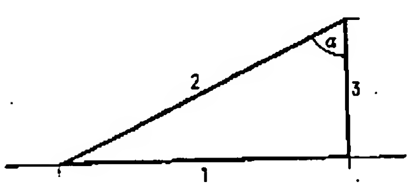
$R$ stranding radius in mm
$L$ length of stranding element in mm
$S$ lay length in mm
$\alpha$ stranding angle in degrees
$2\pi R$ circumference of the stranding circle.

Because of stranding, the stranding elements must be longer than would be necessary if they were parallel to the longitudinal axis. The excess length due to stranding is given in per cent:

$$Z = \frac{L - S}{S} \times 100\% = \left\{\sqrt{1 + \left(\frac{2\pi R}{S}\right)^2} - 1\right\} \times 100\%$$
$$= \left(\frac{1}{\sin\alpha} - 1\right) \times 100\%,$$

(A)

$Z$ excess length due to stranding in %.




$\alpha$ Stranding angle $\alpha$
1 Lay length $S$
2 Length $L$ of stranding element
3 Circumference of the stranding circle $2\pi R$

Figure 9.8
Interdependence of lay length, stranding angle and the length of the stranding elements



The screw line or h
or *bending radius* c

$\varrho = R\{1 + ($

$\varrho$ bending radius in

For the strength and
tant that it should n
permissible radius $\varrho$
the bending radius $\varrho$
length is

$S = 2\pi R\sqrt{\frac{\varrho}{R}}$

**Example**

In an optical cable
stranding radius $R =$
as

$Z = \{\sqrt{1 + ($

Therefore for each
longer.

The stranding angle

$\alpha = \arctan \frac{S}{2\pi}$

The corresponding

$\varrho = 4.3\{1 +$

In reverse lay stran
reaches a maximum
them.

In Figure 9.9 the b
fixed stranding radi
stranding and, for c

In practical applica
ing for the reverse